

Fig. 1

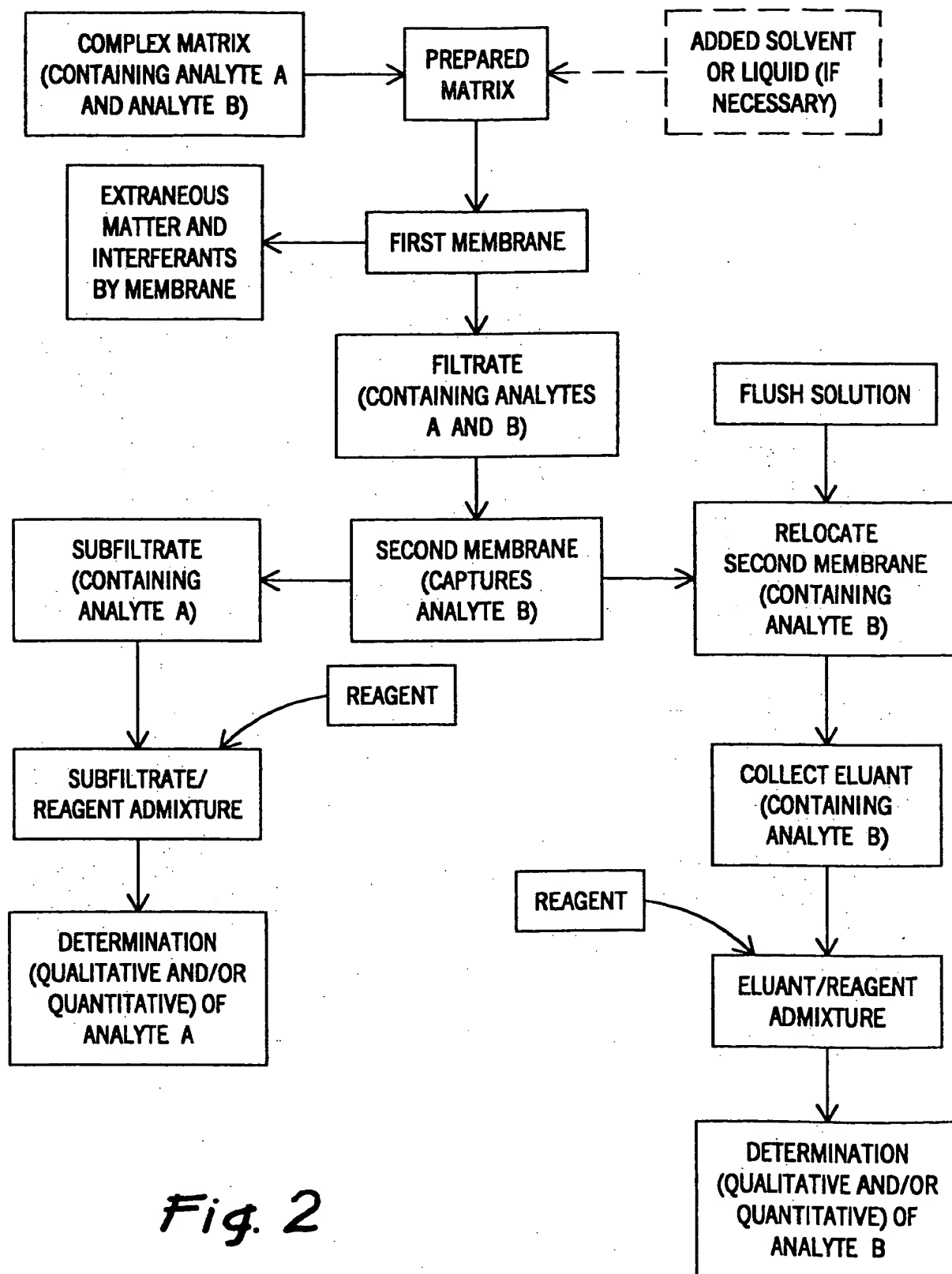
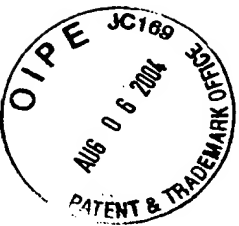


Fig. 2

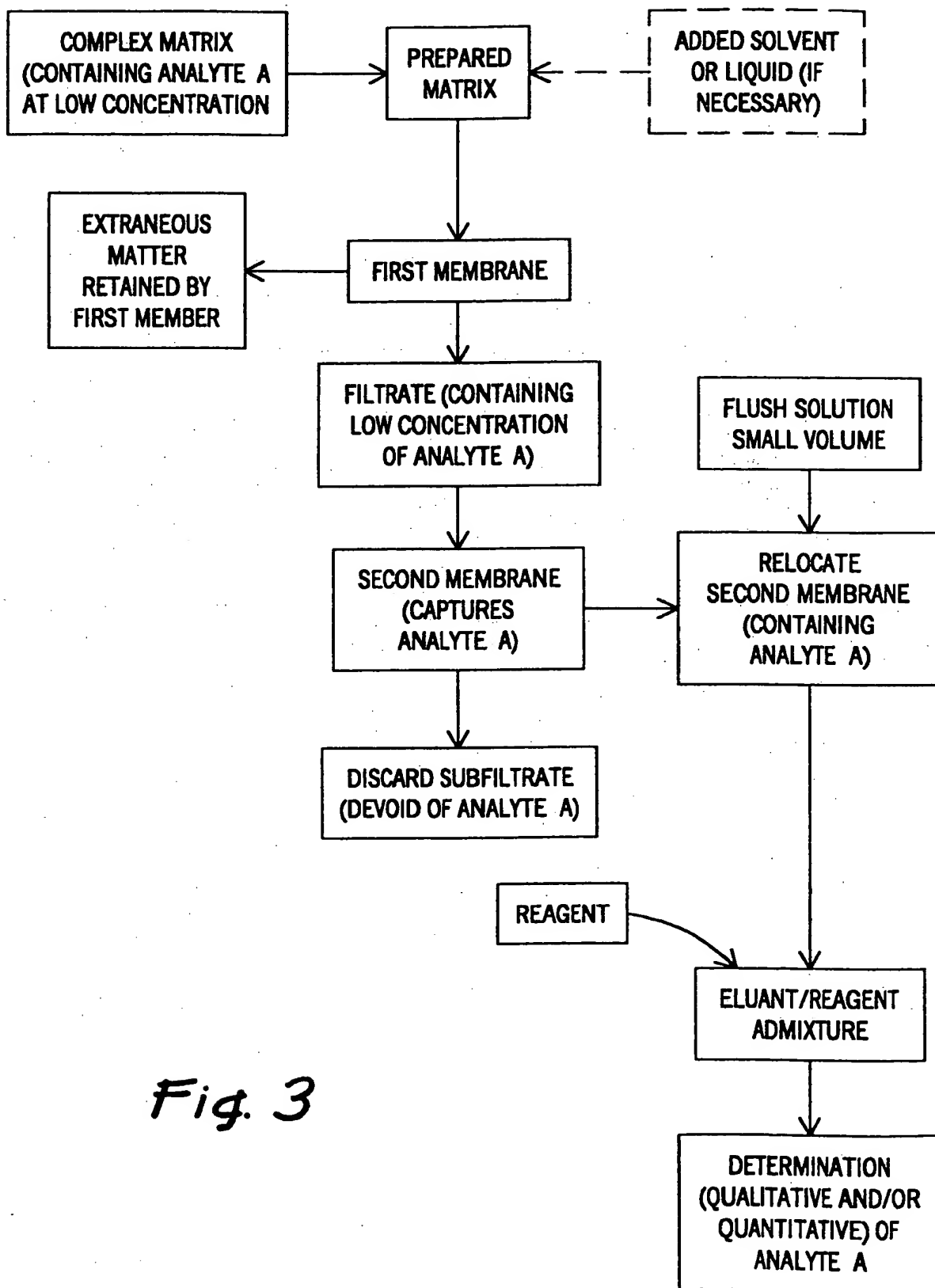
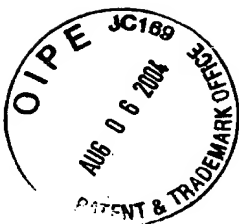


Fig. 3

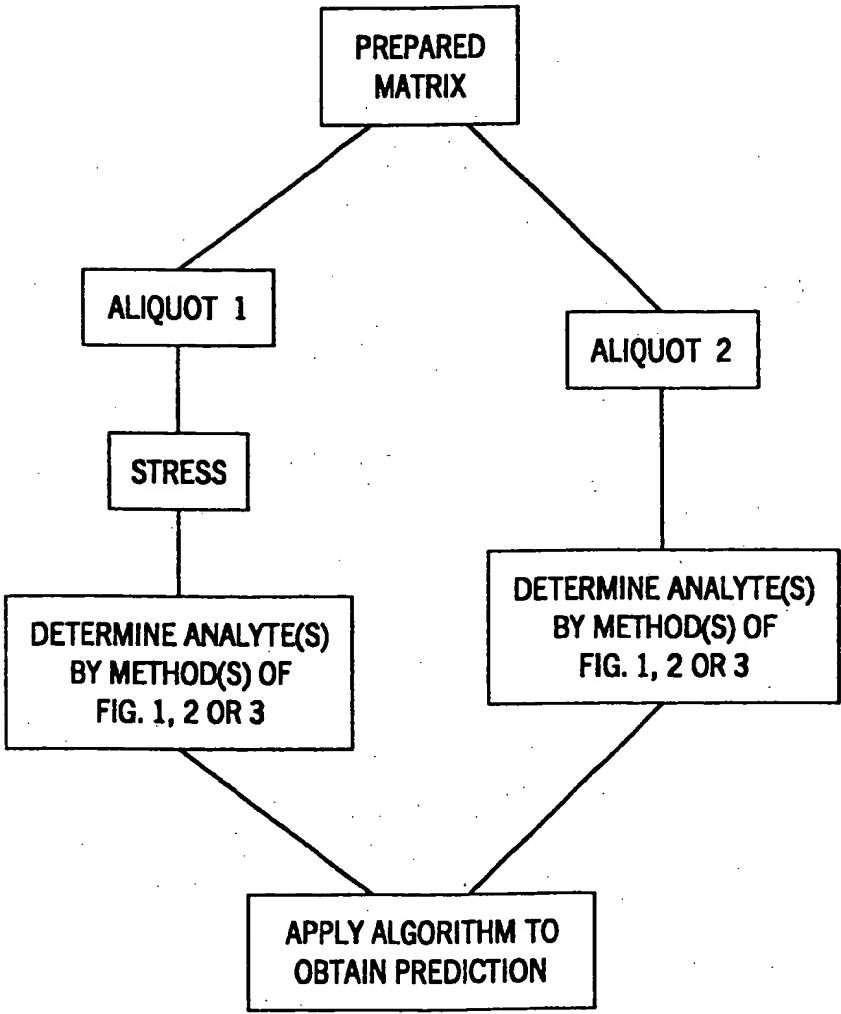
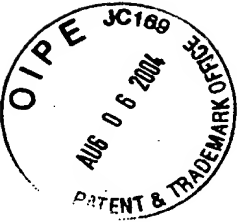


Fig. 4

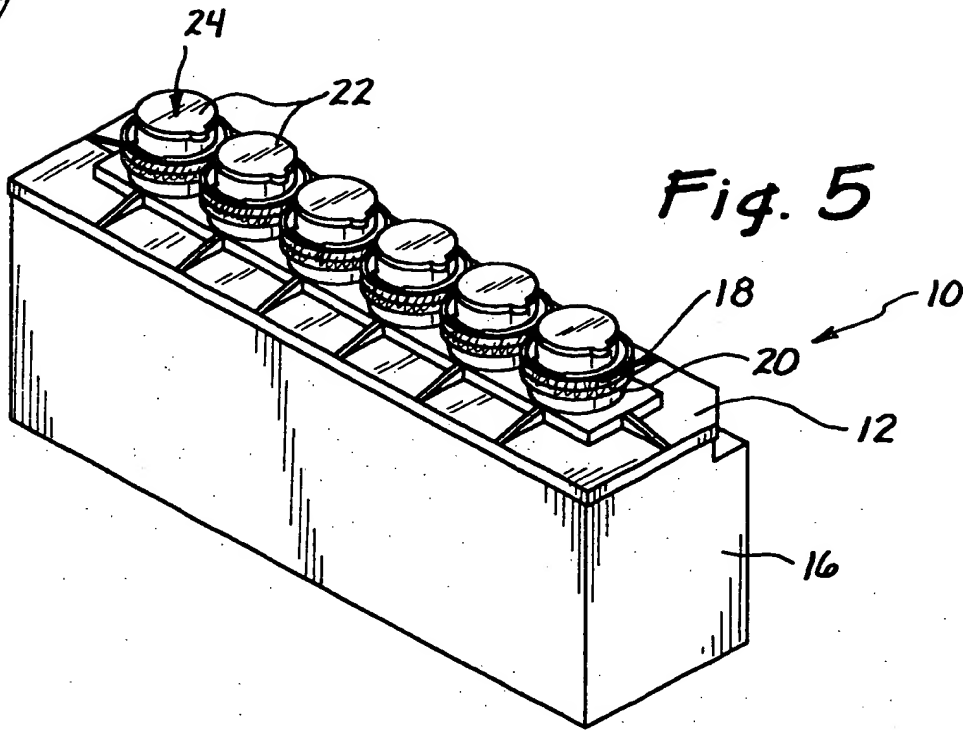
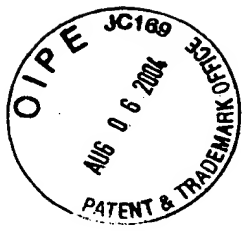


Fig. 5

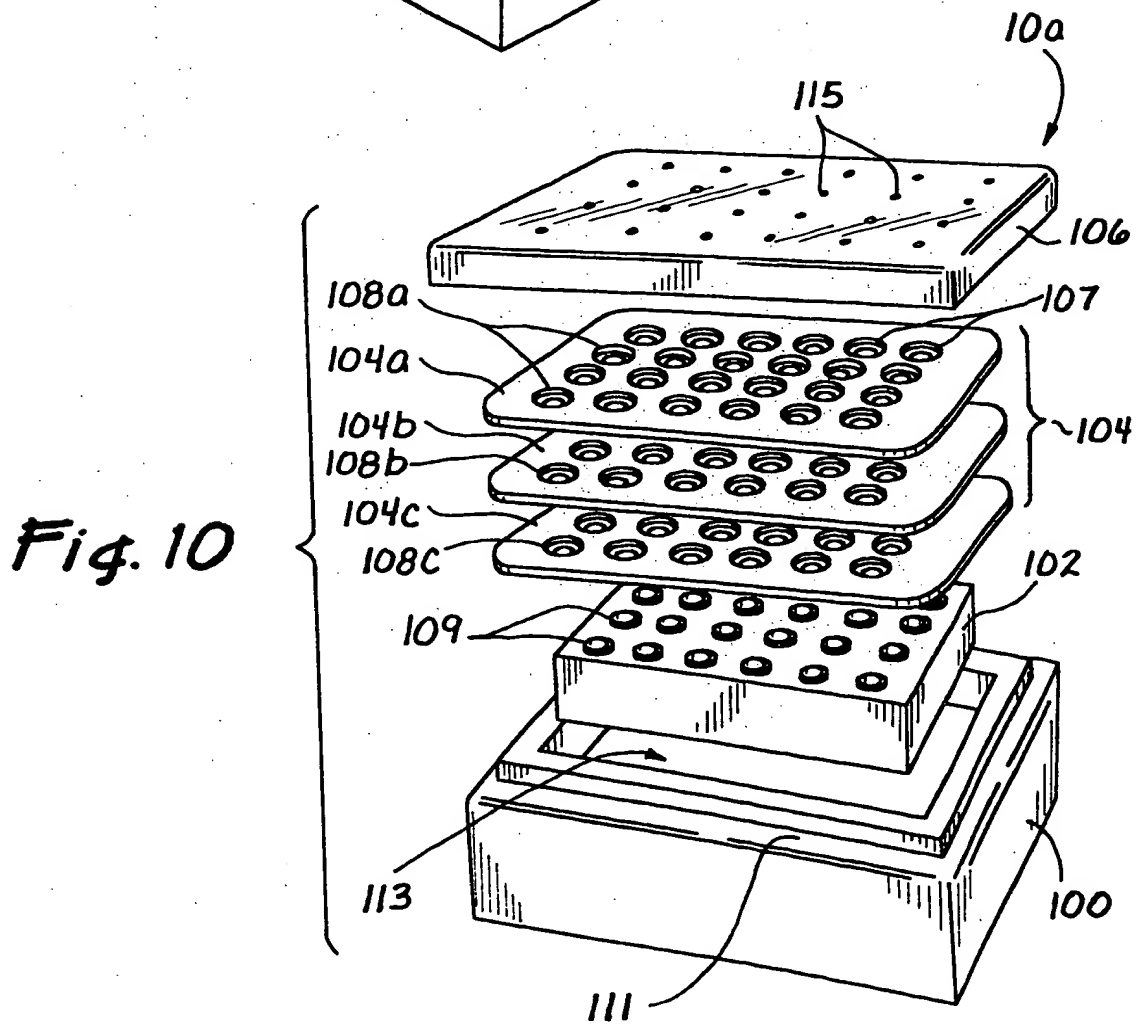


Fig. 10

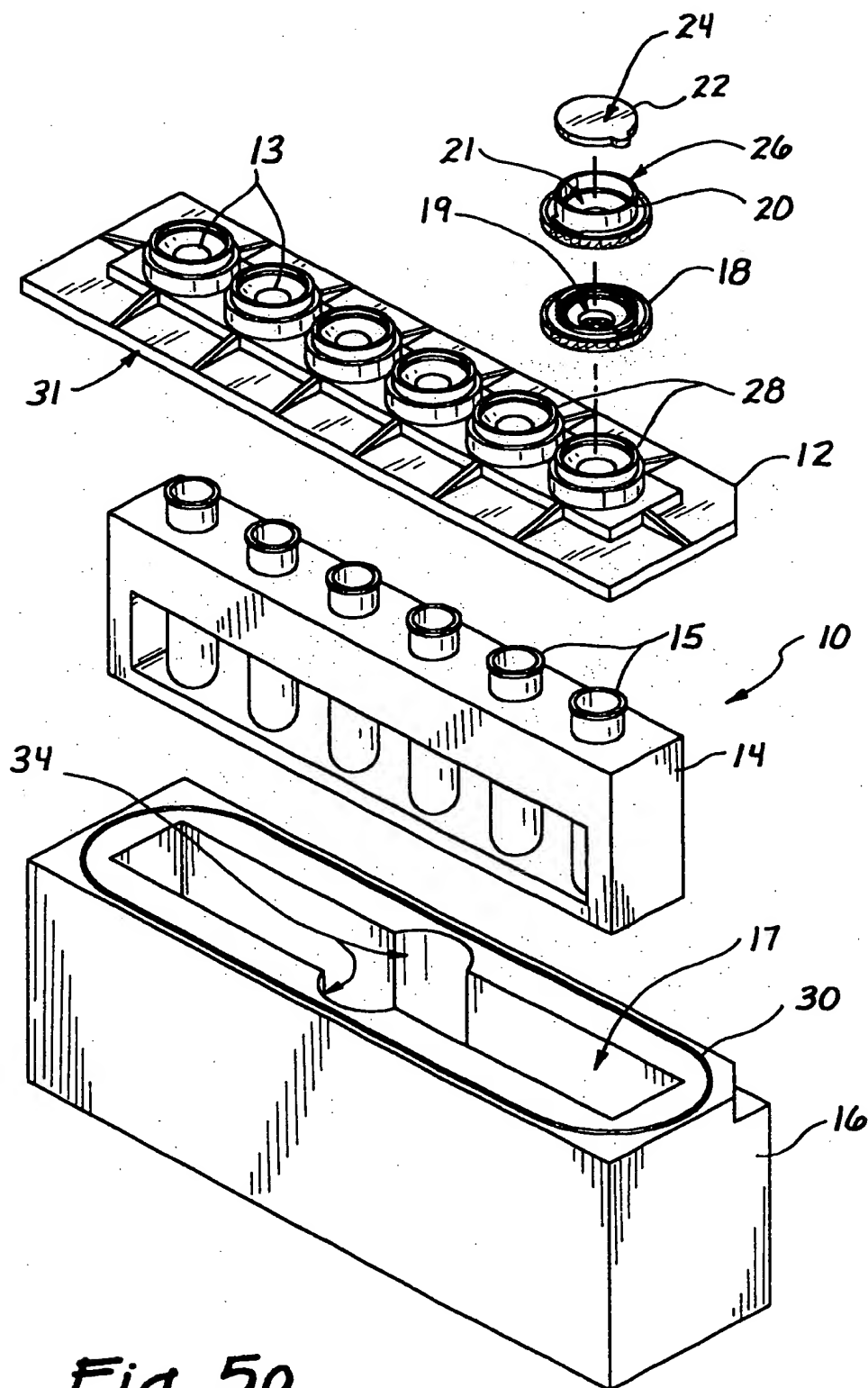
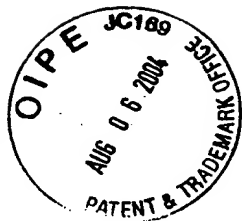


Fig. 5a

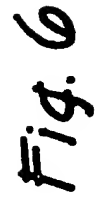
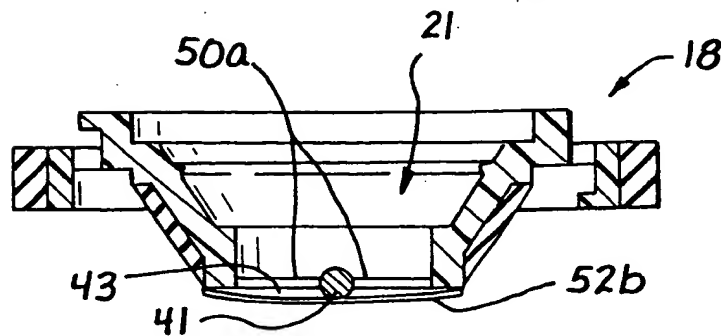
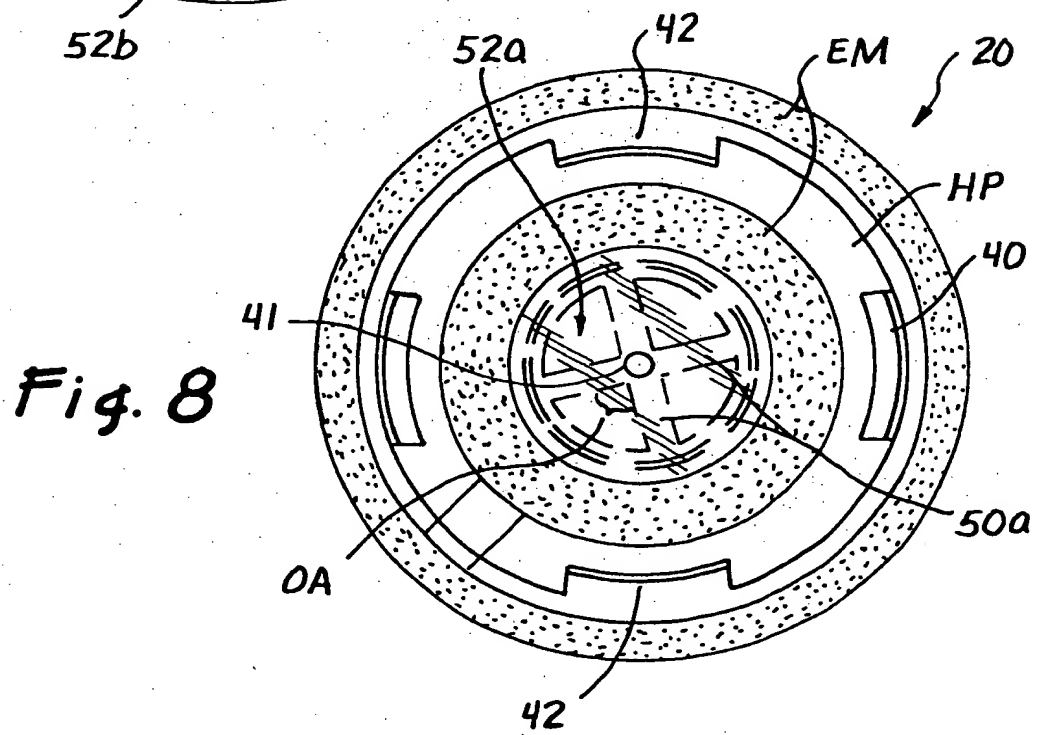
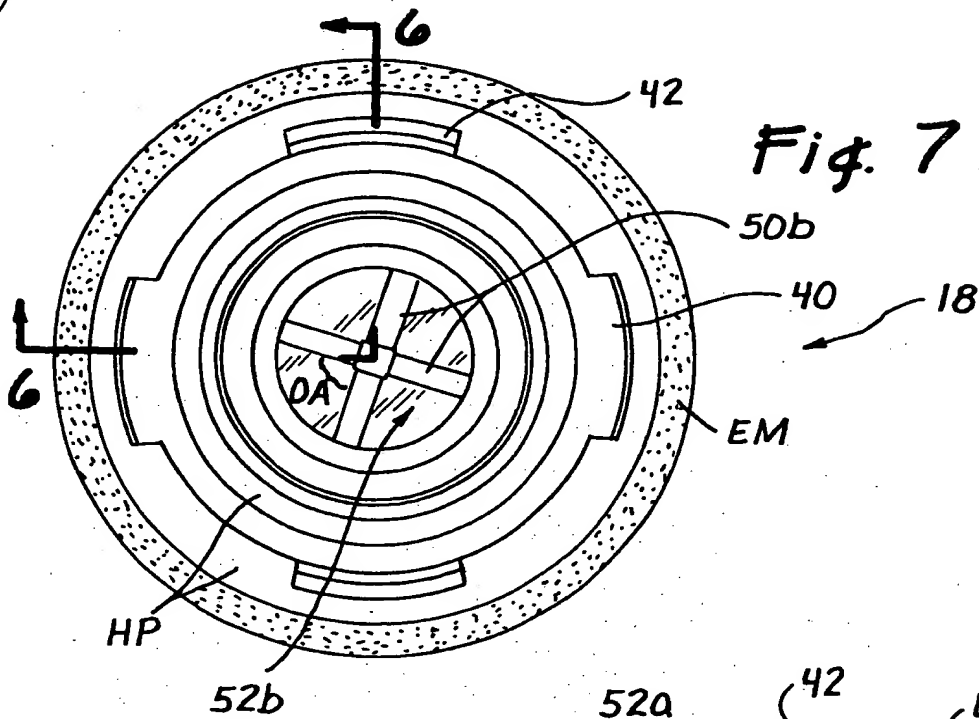
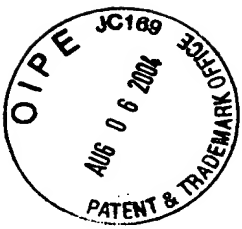


Fig. 6



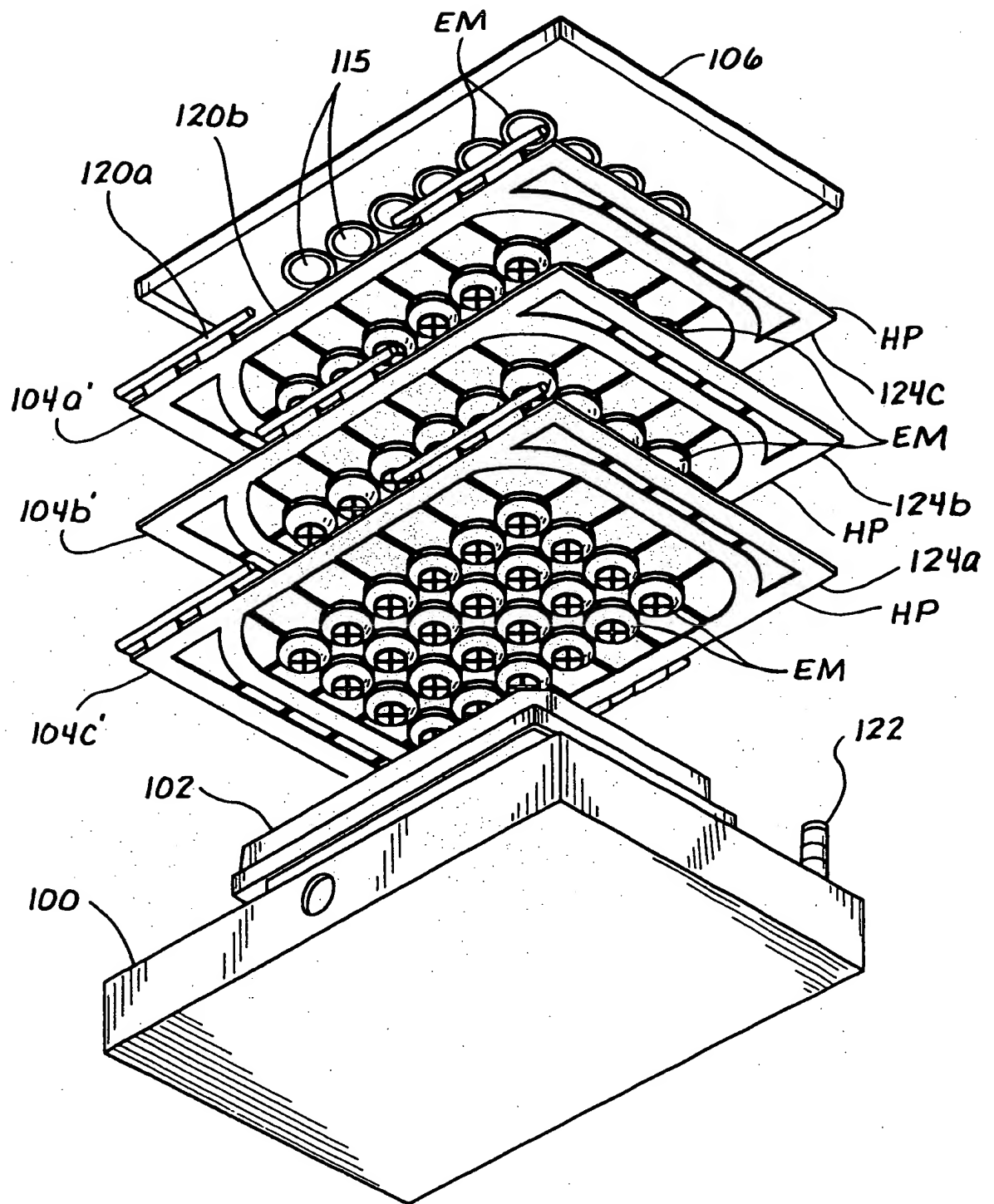
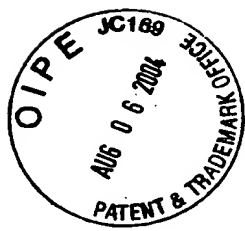


Fig. 10a

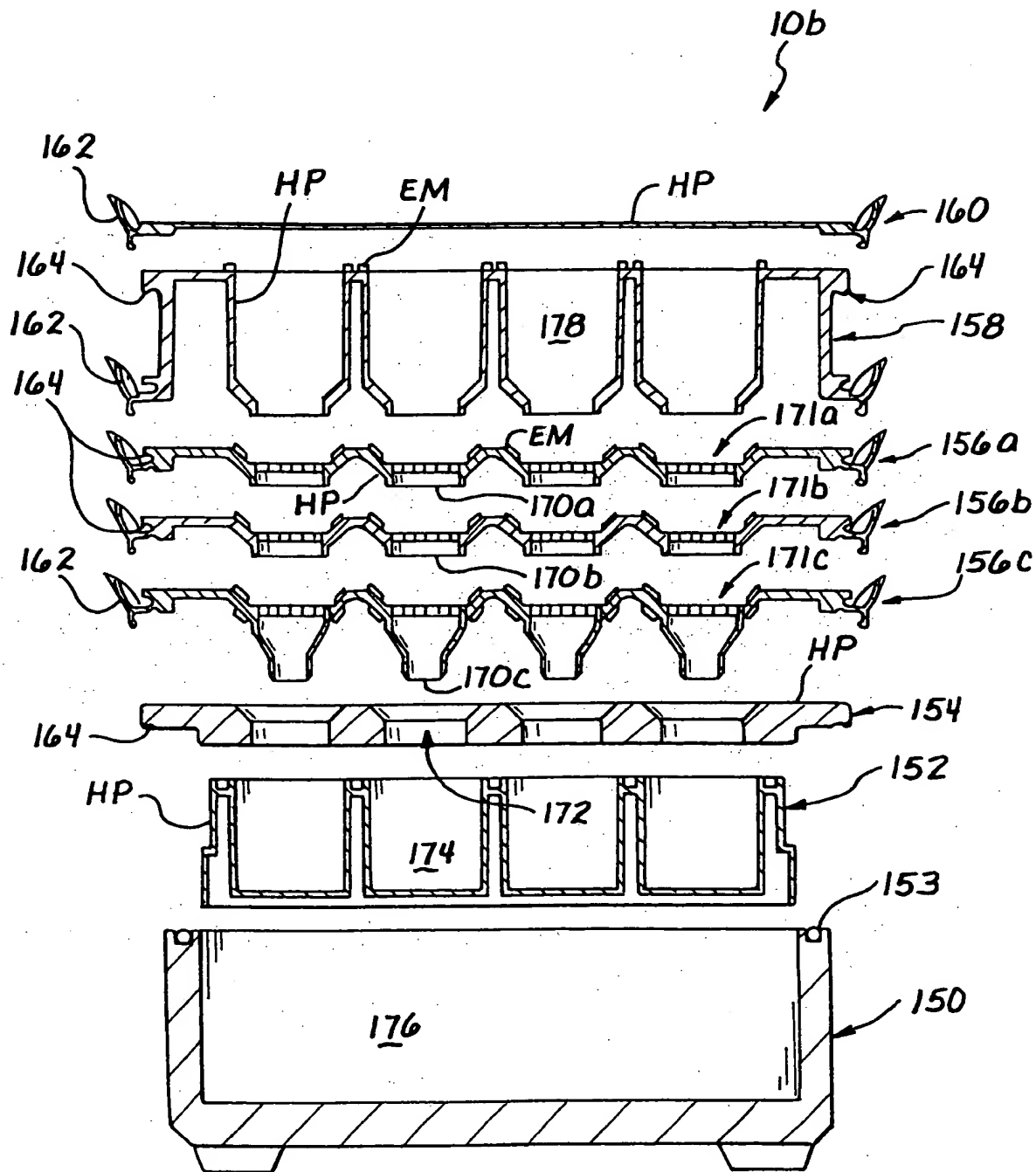
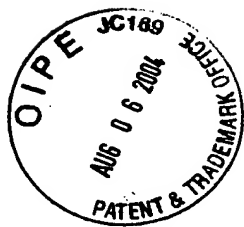


Fig. 11

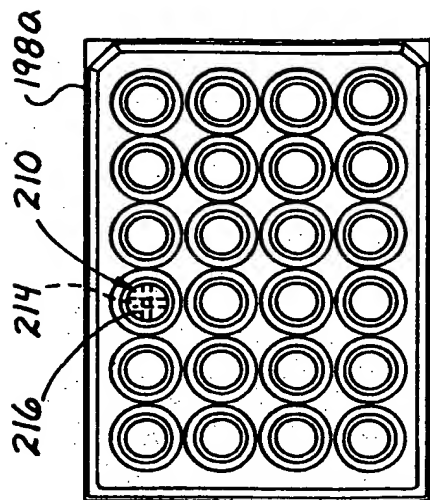
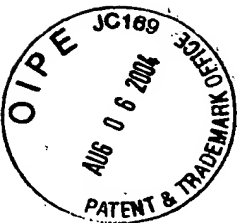


Fig. 12a

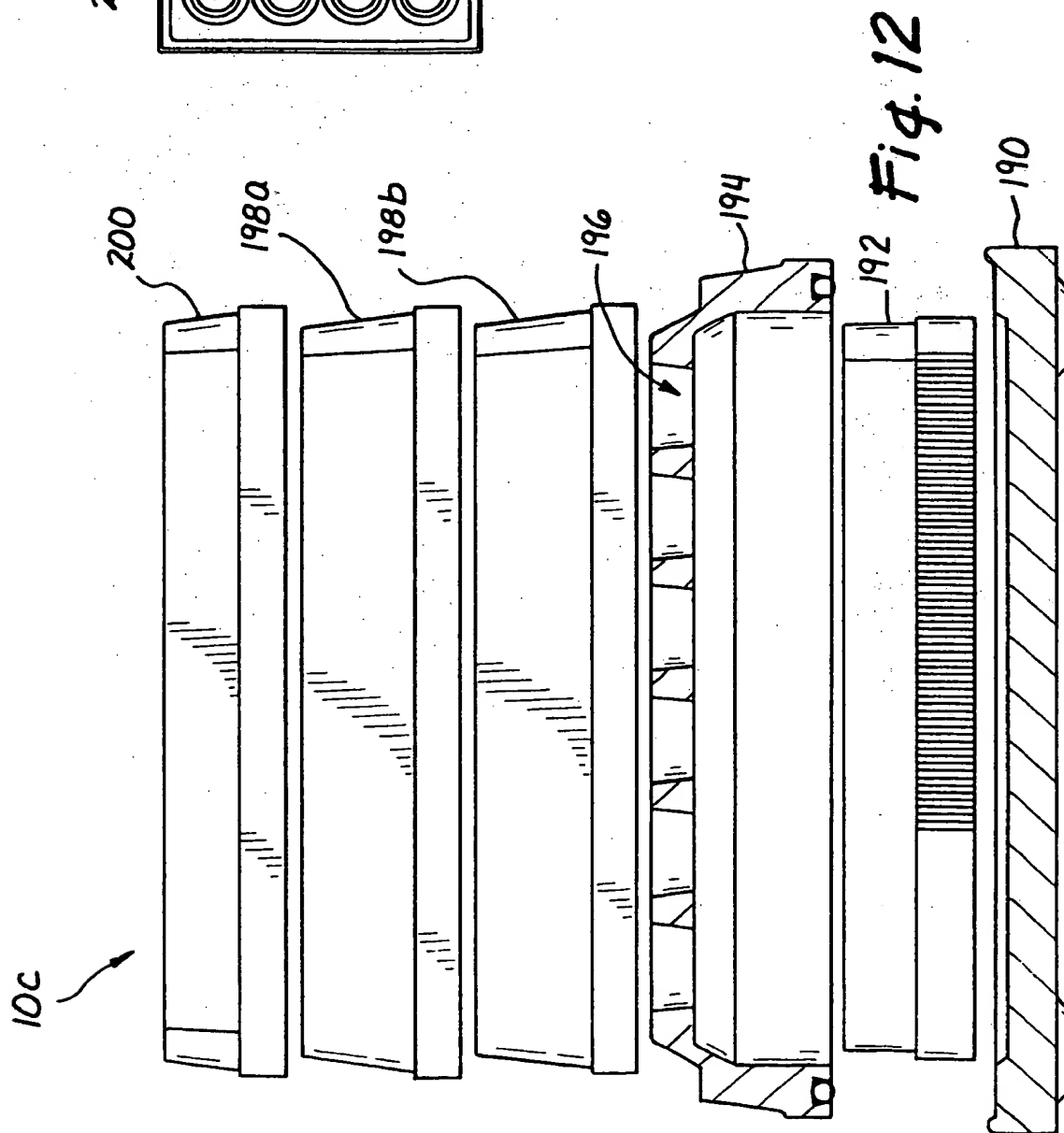


Fig. 12

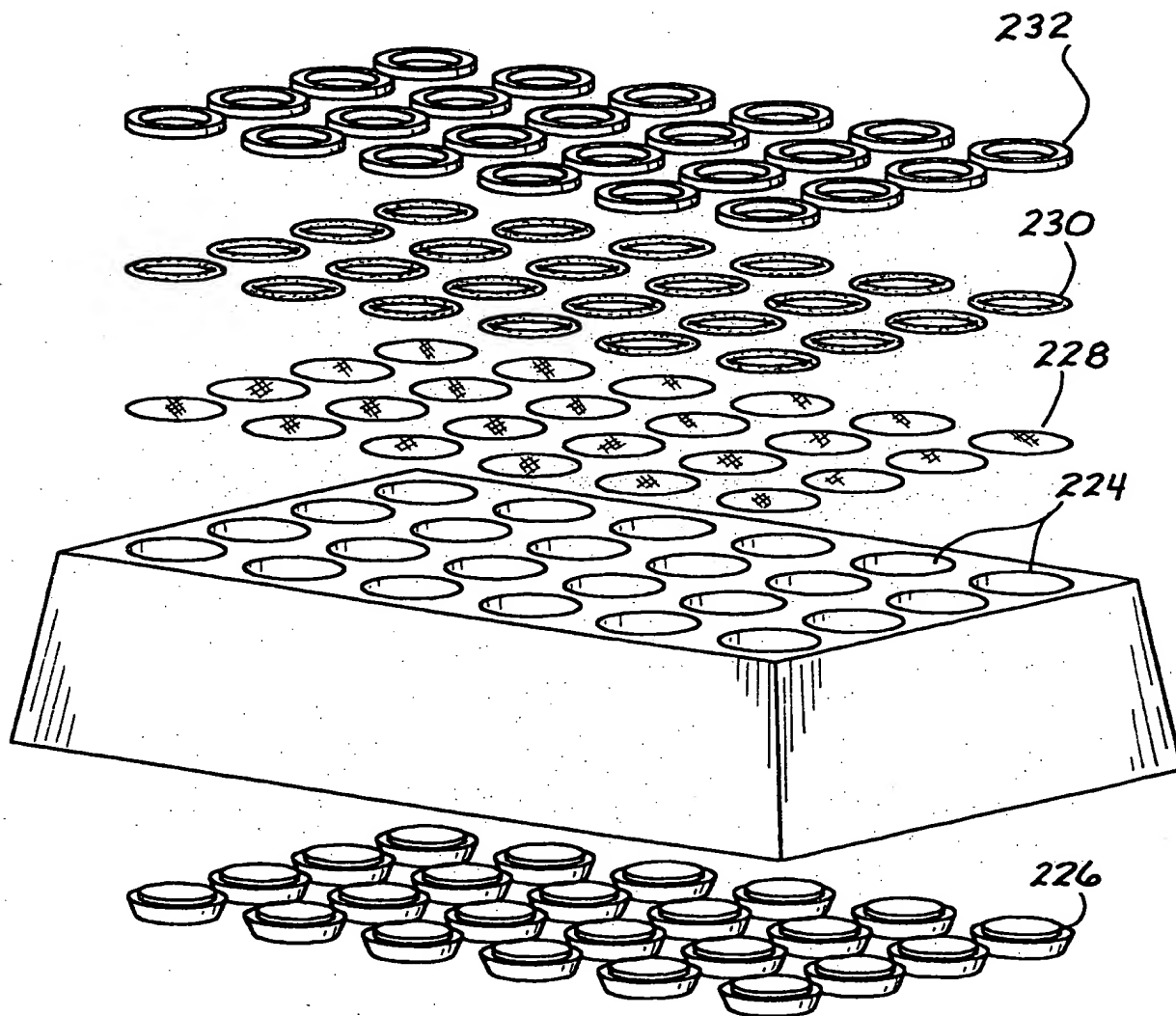
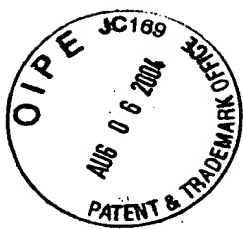


Fig. 13

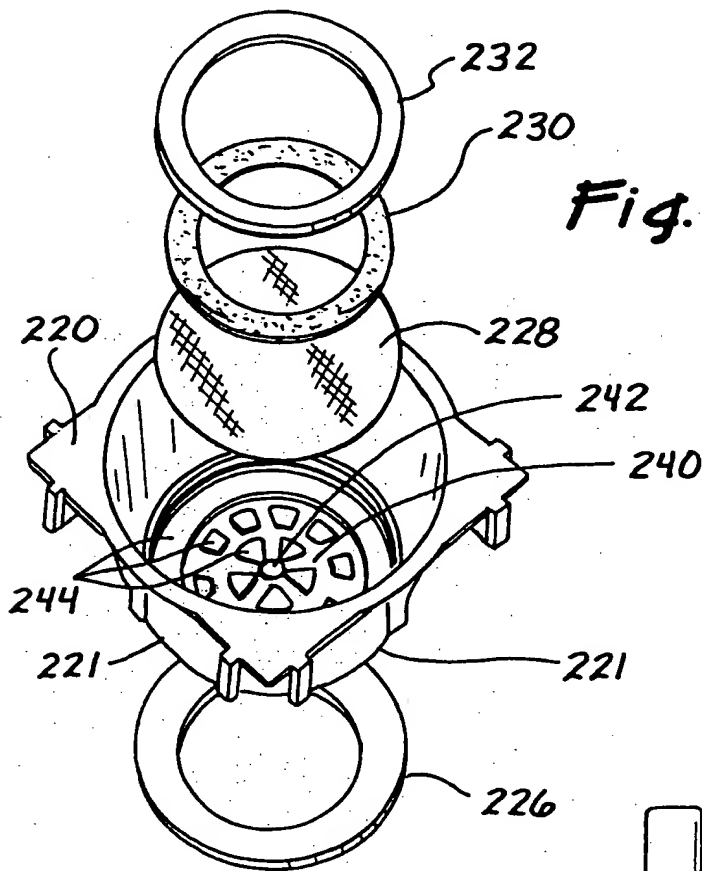
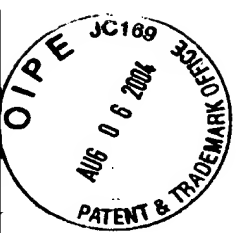


Fig. 13a

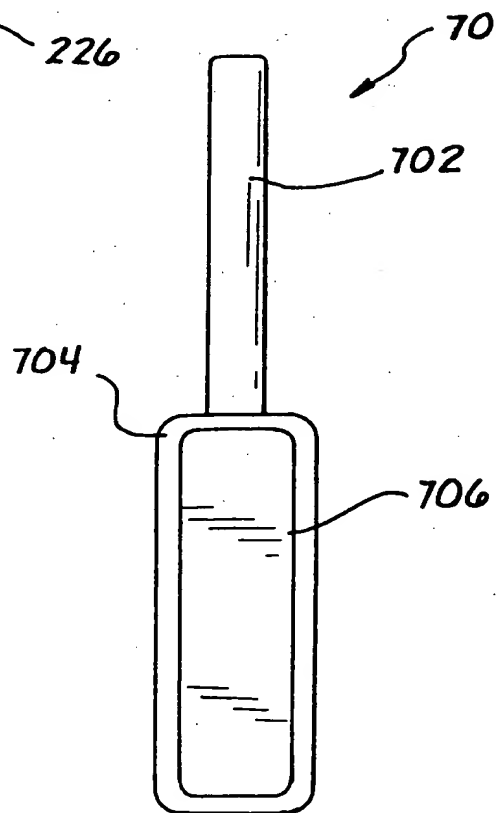


Fig. 17

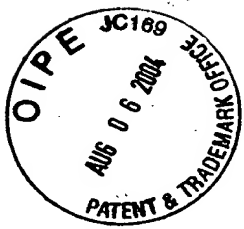


Fig. 14a

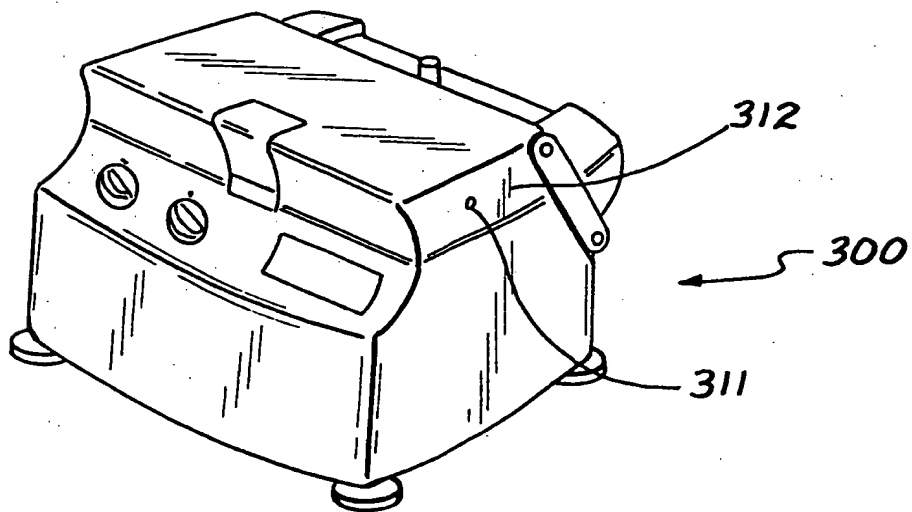
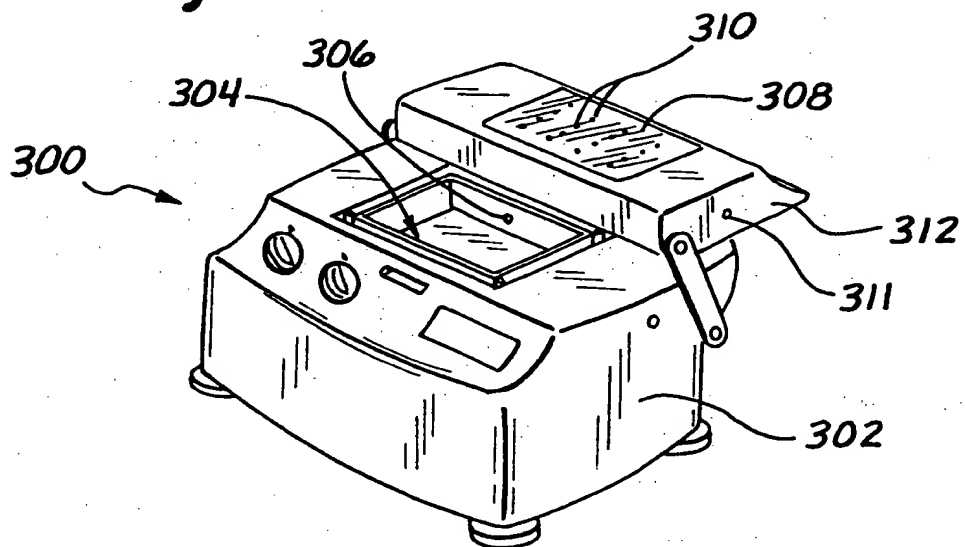


Fig. 14b

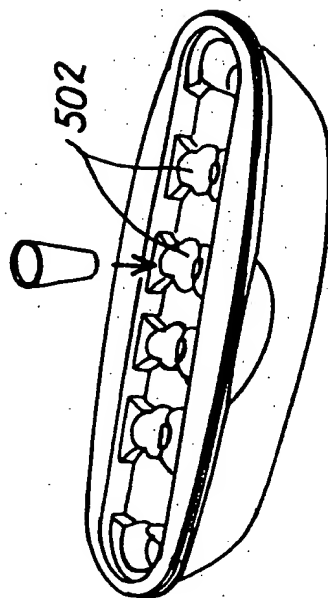
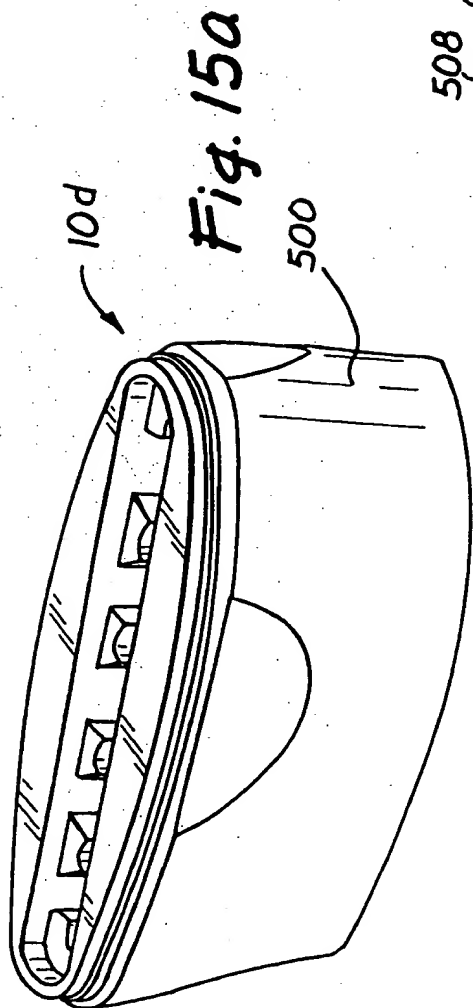
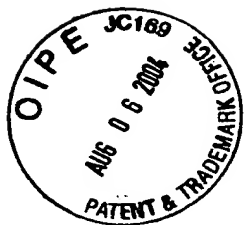


Fig. 15c

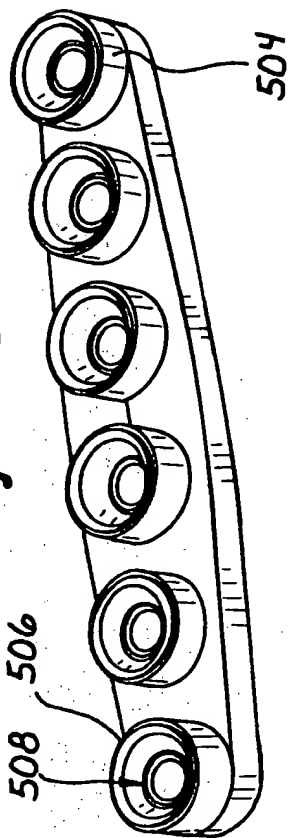
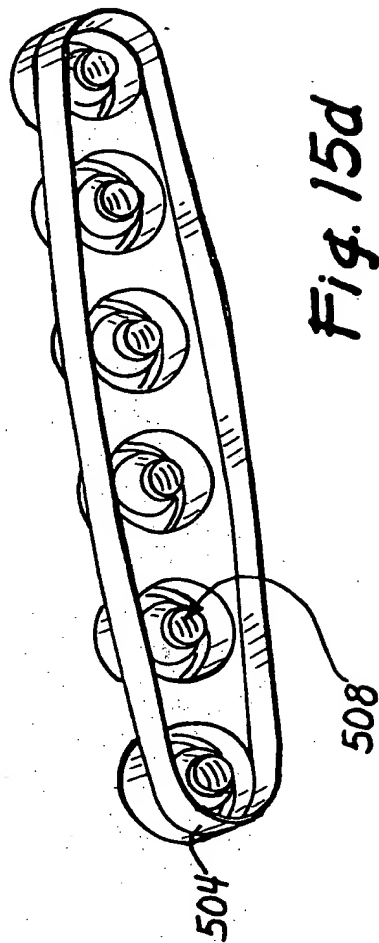


Fig. 15d



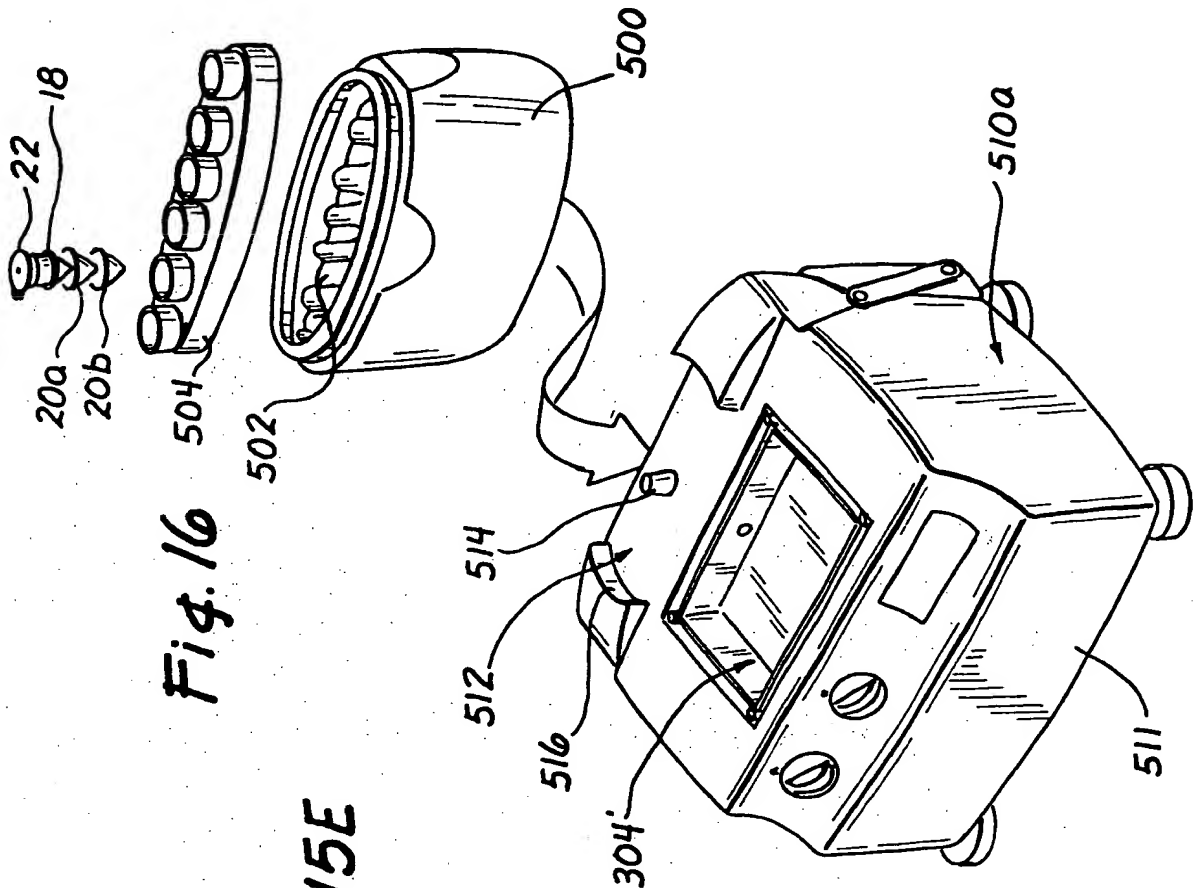
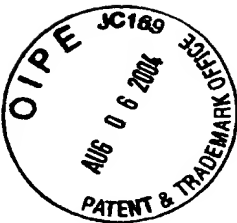


Fig. 16

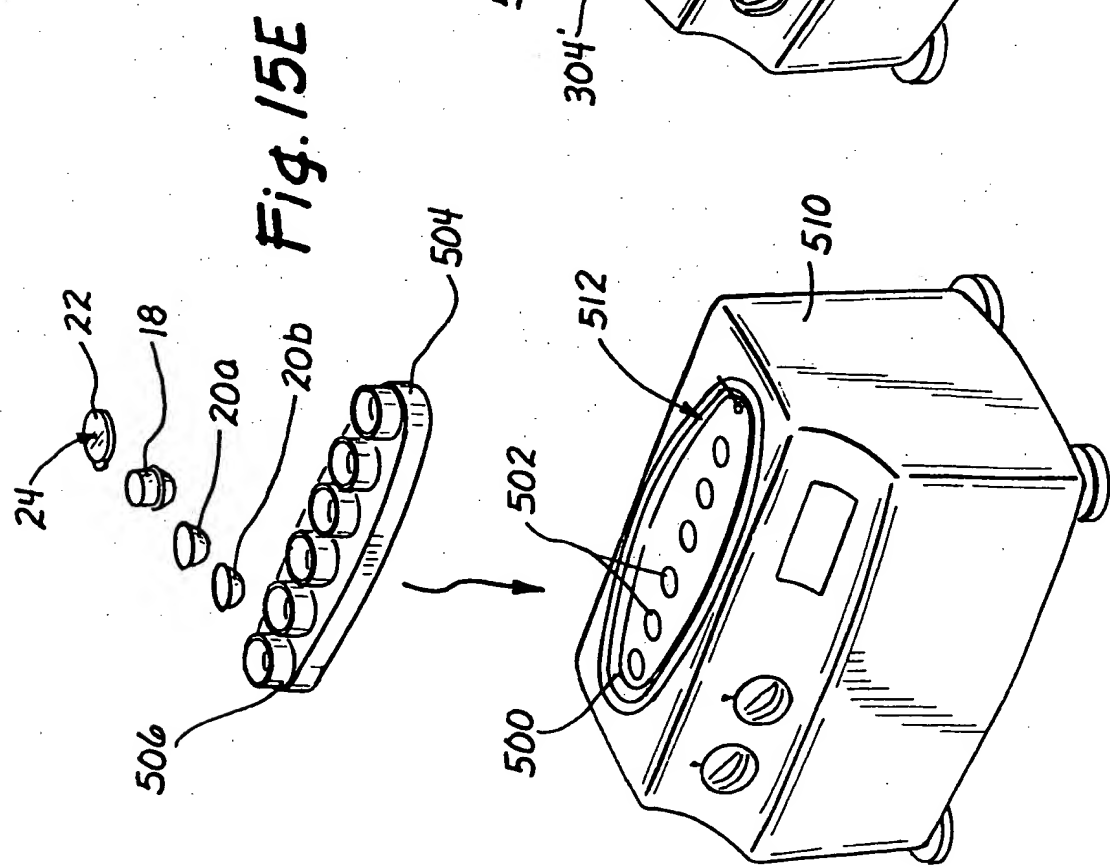


Fig. 15E

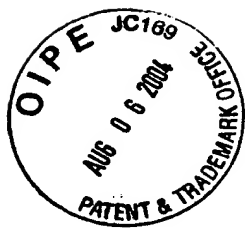
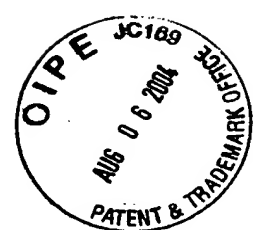


TABLE I

1. New Tests

Analytes	Typical Matrix	Membranes				Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄	R ₁	R ₂	R ₃	R ₄		
1. FFA*, FFA ⁻	Oil Fish Bakery Fast Food Oil in Frying	With or without any other analytes or membrane MCE .45 or Durapore .45 to remove particulates				XO				Spectral 570 or (visual) or color wheel	
2. LPO/FFA	Oil or olive	MCE	Nylon linked decasilyl polymers or silica to bind LPO			XO	XO and Fe ⁺ (acidified)			Spectral Spectral	
3. LPO/FFA*	Oil	MCE	Silica			XO	reduced hemoglobin				
4. LPO/FFA/M DA	Oil/Seafood	MCE	Silica	Diethylamine		XO	XO (Fe ⁺ Acidified)	MI		Spectral	
5. LPO, MDA, FFA after oxidative stress	Oil	MCE	Silica	Diethylamine		XO	XO (Fe ⁺ Acidified)	MI		% change proportional to shelf life Use visible meas. Color change	
6. LPO, MDA, FFA After oxidative stress	Oil Fish Bakery	MCE to remove particulates	Silica to bind LPO	Diethylamine to bind MDA		XO	XO (Fe ⁺ acidified)	MI		Spectral	
7. LPO after oxidative stress	Fish Oil	MCE	MCE			XO (Fe ⁺ acidified)				Spectral	

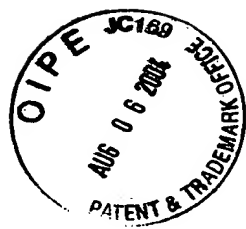
Fig. 18A



1. New Tests

Analytes	Typical Matrix	Membranes				Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄	R ₁	R ₂	R ₃	R ₄		
8.	FFA after Oxidative Stress	Oil	MCE							Spectral	
9.	Polyphenol/LPO	Oil, Olives, Fruit, vegetables	MCE	Silica to bind LPO		Folin (Ciocalteu)	XO (Fe ⁺ acidified)			Spectral	
10.	Polyphenol	Oil	MCE			Folin (Ciocalteu)				Spectral	
11.	Polyphenol and FFA	Oil Fruit Vegetables	MCE	Carboxymethyl to bind Polyphenol		XO	Folin Ciocalteu			Spectral	
12.	Polyphenol MDA/LPO/FFA	Oil Fruit Vegetable	0.8 um to bind particulates	Silica or nylon with lipid solubilizing decalyl to bind LPO	Carboxy methyl weakly acidic membrane to bind polyphenols	diethylamine to bind MDA	XO (Fe ⁺ acidified)	Folin (Ciocalteu)	MI	Spectral	
13.	LPO Ratio for Antioxidant Status	Oil Fish	MCE			XO/Fe ⁺ acidified				Spectral	
14.	Unsaturated linkage/LPO Value	Oil	MCE	Lipid solubilizing polymer attached nylon bind LPO		I ₃ → I ₂	XO (acidified Fe)			Spectral	
15.	Unsaturated linkage, MDA	Oil	MCE	diethylamine		I ₃ → I ₂	MI			Spectral	
16.	LPO, FFA, Histamine	fish beverage	MCE	Sulfonic Acid	Silica	XO	DAO and XO (Fe ⁺ acidified)	XO (Fe ⁺ acidified)		Spectral	

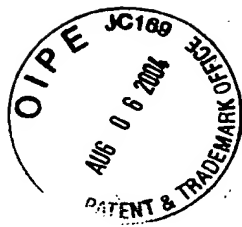
Fig. 18B



I. New Tests

Analytes	Typical Matrix	Membranes					Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄		R ₁	R ₂	R ₃	R ₄		
17. LPO/FFA/MDA	Fish beverage	MCE for particulates	Diethylamine to bind aldehydes for MDA	Lipid solubilizing polymer bound nylon to bind LPO			XO test for FFA	MI test for MDA	XO (Fe ³⁺ acidified) LPO		Spectral	
18. LPO/Histamine	fish cheese sausage	MCE	Biodyne C or Sartobind Q for histamine binding				XO Fe ³⁺ acidified	diamine oxidase and XO Fe (acidified)			Spectral	
19 A Polymer vs. non-polymer triglycerides	Cooking Oils	Membrane with MW Cutoff 500					Lipase with glycerol kinase +	detect H ₂ O ₂ with chromogen			Spectral	
19 B Polymer vs. non-polymer Oxidized trigly	Cooking Oil	MW cutoff 500					Lipase/glycerol 3 PO ₄ oxidase				Spectral	
20. Mycotoxins1 Mycotoxins2 Mycotoxin 3	Grain	MCE	mab1 bound NH ₂ on regen cellulose	mab2 bound NH ₂ on regen cellulose	mab1 bound NH ₂ on regen cellulose		Mycotoxin1 enzyme conjugate	Mycotoxin2 enzyme conjugate	Mycotoxin3 enzyme conjugate (peroxidase mycotoxin conjugate) Measure H ₂ O ₂ produced		Spectral	
21. MDA/Sulfite	beer wine	MCE Prefilter or versapor prefilter	IDA to remove pigments and metals	Sartobind Q to bind aldehydes			Fe ³⁺ (XO) ↓ Fe ²⁺ (XO) blue → yellow For sulfite	MI for MDA			Spectral	
22. ATP Separation from ADP & AMP	fish other living material degradation	MCE Prefilter or negative adsorbent	Diethylamine				ATP detected by bioluminescence detection luminol	ADP + AMP by bioluminescence detection luminol			Spectral	

Fig. 18C



1. New Tests

Analytes	Typical Matrix	Membranes					Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄		R ₁	R ₂	R ₃	R ₄		
23. Histidine/Histamine	fish	MCE	Carboxymethyl to bind histamine				TBPH detect histidine Tetrabromophenol blue	DAO + HRP + Methylene blue Detect Histamine			Spectral	
24. Histamine	wine, fish	1 minodi acetic acid to (bind pigments) remove metals	IDA membrane to bind metal				DAO + XQ Fe ³⁺ acidified				Spectral	
25. Separation histamine* from all rest amines	Fish Sausage Cheese	1 minodi acetic acid remove metals	Sulfonic acid membrane bind other amines				DAO + XQ Fe ³⁺ acidified	measure test amines using Xylidyl blue			Spectral	
26. Total Polar Compounds	Cooking Oil	Silica to bind polar					quantitate non-polar lipase and ***	quantitate polar lipase ***			Spectral	
27. Total Polar Compounds	Cooking Oil	Bind non-polar to hydrophobic membrane					quantitate polar ***	quantitate non-polar ***			Spectral	
28. FFA or biliary acids	plasma or serum cows, humans	MCE to remove rbc etc. lipo proteins					XO to test for FFA				Spectral	

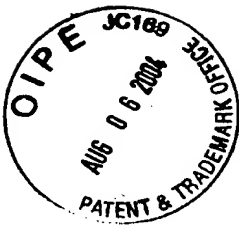
* Proprietary

** After Stress

*** lipase → glycerol and ATP → glycerol kinase and pyruvate kinase lactate dehydrogenase

*called acidity value fish, bakery, wine

Fig. 18D



Analytes	Typical Matrix	Membranes				Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄	R ₁	R ₂	R ₃	R ₄		
29. Polyphenol/F FA for prediction of adulteration	Oils	MCE	Carboxymethyl			XO	Folin Ciocalteu			Spectral	
30. Polyphenol/F FA LPO to predict adulteration & aging	Oils	MCE	Carboxymethyl to bind polyphenol	Silica		XO	XO (Fe ³⁺ acidified)	Folin Ciocalteu		Spectral	
31. Polyphenol/F FA to predict adulteration	Oils	MCE	Carboxymethyl			XO	Folin Ciocalteu			Spectral	
32. LPO/M DA/Acidity Irradiation To Predict time for mycotoxin growth	Oils Fish grain	MCE	Silica	diethylamine		XO	XO Fe ³⁺ (acidified)	MI		Spectral	
33. FFA distribution	Oil predigested with lipase	MCE	Mab1 to Oleic	Mab5 Stearic	Mab3 - Linoleic	XO	XO	XO		Spectral	Same ratio predict oil type oleic/stearic/linoleic
36. Polyphenol/F FA/TG	Oil	MCE	Strong acid sulfonic bind ROH ⁺	Lipid solubilizing polymer bound nylon to lipid peroxides		XO	Folin Ciocalteu for polyphenol	Enzymatic determination triglyceride = T _g with lipase as in 19A.		Spectral	
37. Anions	Beer	MCE	IDA			Flush Fe Cl ₃ replace anions change color				Spectral	
38. Aldehyde, bisulfites	Beer	MCE	diethylamine			Fe ³⁺ (XO) reduced by bisulfite	MI			Spectral	
39. Protein, aldehyde	Beer	MCE	diethylamine			Commaasie Blue for protein	MI			Spectral	

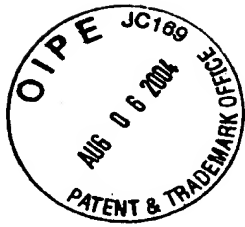
Fig. 18E



Analytes	Typical Matrix	Membranes				Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄	R ₁	R ₂	R ₃	R ₄		
50. Tetracycline Antibiotics in milk	Milk	MCE	decallyl coated membrane			direct read at 365 nm				365nm Spectral	
51. Aflatoxin	Milk and Aflatoxin Conjugate	MCE				Enzyme substrate = peroxidase aflatoxin conjugate and urea peroxide and tetramethylbenzidine chromogen				Spectral	

PPO = Polyphenol

Fig. 18F



Others

Analytes	Typical Matrix	Membranes				Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄	R ₁	R ₂	R ₃	R ₄		
52. Microbes	Food	Versapor Particulates	IGN-6 binds microbes			Direct				Reflectance	
53. Metals	Food	Versapor Particulates	IDA to bind Metal			Test for metals Zircon Zircon + Metal → deep blue				Spectral	

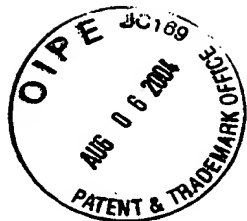
Analytes	Typical Matrix	Membranes				Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄	R ₁	R ₂	R ₃	R ₄		
54. Any Analytes	Food	Stacked bundle .8, .45 of M1 + M2++				Any of above				Spectral	

**Laminated



DEAE Cellulose
Nylon

Fig. 18G



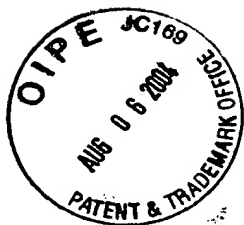
LPO Reagent Only

2. Chemical /Personal Care

Analytes	Typical Matrix	Membranes				Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄	R ₁	R ₂	R ₃	R ₄		
1 LPO, HFA, and MDA	Fragrance Oil	MCE	diethylamine	Silica		XO	MI	XO (Fe ⁺ acidified)		Spectral	
2 LPO after oxidative stress to predict shelf life	Oil Skincare Product	MCE					XO (Fe ⁺ acidified)			Spectral	
3 LPO after UV exposure to determine SP or UVA	Biological matrix cells	MCE					XO (Fe ⁺ acidified)			Spectral	Test to UVA
4 LPO after stress formulation	Formulation with or without stress; compare formulation Trolox	MCE					XO (Fe ⁺ acidified)			Spectral	Test efficacy
5 LPO	Oxidative stressed cells digest	Versapor					XO (Fe ⁺ acidified)			Spectral	Oxidative stress prediction mode of action

Stress "toxicant" take sample before and after stress

Fig. 18H



3. Medical

Analytes	Typical Matrix	Membranes				Reagents				Detection Method	Comments
		M ₁	M ₂	M ₃	M ₄	R ₁	R ₂	R ₃	R ₄		
1. VLDL LDL HDL	Serum	Membrane 300,000 MW trap VLDL	Membrane 100,000 MW cut-off trap LDL	Membrane 10,000 MW cut- off trap HDL		quant VLDL cholesterol	LDL cholesterol	HDL cholesterol		Spectral 510	
2. LDL and oxidized LDL (LDL _{ox})	Serum	300,000 MW cut-off membrane	LDL- Trapped diethyl amine			(Use cholesterol oxidase and substrate)					
3. LPO to determine AOS	Serum	MCE				LDL cholesterol detection	Rinse LDL- Cholesterol detection oxidized			Spectral 510	
4. LPO in serum to determine age	Serum	MCE				XO Fe ⁺ Acidified				Spectral	
5. FFA	Serum	MCE				XO Fe ⁺ Acidified				Spectral	
						XO				Spectral	

Fig. 18I

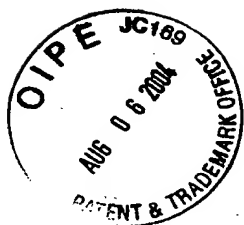


TABLE II

Key to Acronyms

AOS.....	Antioxidant Status
ADP	Adenosine Triphosphate
AMP	Adenosine Monophosphate
ATP	Adenosine Triphosphate
DAO.....	Diamine Oxidase
FFA	Free Fatty Acids
HA	Histamine
HDL	High Density Lipoproteins
HRP.....	Horseradish Peroxidase
I ₂	Iodine Vapor
I ₃	Triiodide Ion
IDA	Iminodi Acedtic Acid Membrane
LDL	Low Density Lipoproteins
LDL-.....	Oxidized Low Density Lipoproteins
LPO	Lipid Peroxides
Mab.....	Monoclonal Antibody
MCE	Mixed Cellulose Ester
MDA	Malonaldehydes
MI	Methylindole
SP	Sun Protector Factor
TBPB	Tetra Bromophenol Blue
TG	Triglyceride
TL	Total Lipids
SF	Sulfite
VLDL	Very Low Density Lipoproteins
XO	Xylenol Orange

Fig. 19

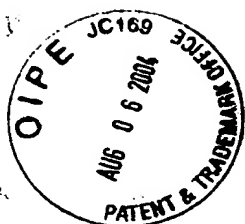


TABLE III

Predictive Algorithms

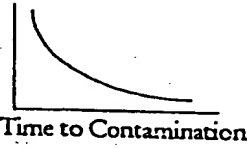
1.	Prediction of Olive Oil Adulteration using product FFA X Polyphenol Please refer to row 29 of Appendix I.	FFA X Polyphenol – Numerical Scale > 50 not adulterated < 50 likely adulterated
2.	Shelf Life Prediction based on MDA/LPO ratio	MDA/LPO is a scale 0 to 5 0-0.5 67% shelf life remains 0.5-1 33% shelf life remains 1-2 15% shelf life remains > 2 5% shelf life remains
3.	Shelf Life Prediction based stress with peroxy generator	% change related to shelf life 0-10% > 18 months 10-30% 12-18 months 30-50% 6-12 months >50% < 6 months
4.	Freeze/Thaw Prediction using ratio Acidity/LPO	Ratio Freeze/Thaw 0-0.2 one 0.2-0.4 two 0.4-0.6 three 0.6-0.8 four
5.	Prediction of time to Mycotoxin contamination using LPO value Please refer to row 33 of Appendix I.	LPO  Time to Contamination
6.	Prediction if food is Irradiated using FFA/LPO ratio	Food non-irradiated has expected FFA/LPO of <1 Food Irradiated increases FFA/LPO >1

Fig. 20

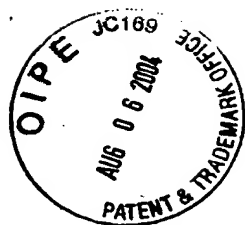


TABLE IV

<u>SHLEICHER & SCHUELL, GmbH</u> P.O. Box 4, D37582, Dassel, Germany	<u>APPLICATION</u>
1. Cellulose Acetate, 0.45 um's 25 mm discs - 23710	Removal of solid matter, proteins > .45 mm
2. Polyvinylidene Fluoride, 0.2 um's, 25 mm disks - 413005	Removal of solid matter, proteins
3. NA45 DEAE Cellulose Membrane, 0.45 um's, 25 mm discs - 23110	Antibody coating
4. NA45 DEAE Cellulose Membrane, 0.45 um's, 4x51/4 inches - 23430	Capture aldehydes
5. Nylon, 0.45 um's, 25mm discs - 00130	Capture of malonaldehyde, sulfites, sulfite-bound aldehydes
6. Nylon, 0.2 um's, 25 mm discs - 00030	Removal of solid matter, proteins > .45 mm
7. NL Polyamide	Removal of solid matter, proteins > 2 mm
8. PC Polycarbonate	Capture organohalides
	Capture aldehydes
<u>Porotex Corporation</u> 111 A Lindbergh Ave., Livermore, CA 94550	<u>APPLICATION</u>
1. MicroPrep, PTFE, PP, NS, 0.2 um's, 13 mm - 97844	Capture compounds having fatty acid chains lipid peroxides
2. MicroSpin, Nylon, 0.45 um's, Micro-Cent. tubes - 97795	Removal of solid matter, proteins
3. Ultra-Spin, CTA, PP S, 10k MWCO, Micro-Cent. Tubes - 97771	Removal of solid matter, proteins
4. Silver Membranes, 0.4 um's, 25mm - 51133	Capture of volatiles
5. Polycarbonate Membranes, 0.4 um's, 25 mm, PVP Free - 11030	Capture aldehydes
6. Polycarbonate Membranes, 0.4 um's, 25 mm, AOX - 11027	Capture chlorinated molecules
7. Polycarbonate Membranes, 0.45 um's 47 mm, Low extr. - 13035	Capture aldehydes
8. Polycarbonate Membranes, 0.2 um's, 8" x 10", PVP Free - 19416	Capture aldehydes
<u>MILLIPORE CORPORATION</u> 80 Ashby Rd., Bedford, Ma 01730-2271	<u>APPLICATION</u>
1. Isopore, 0.1 um's, 25 mm discs - VCIP 025 00	Removal of solid matter proteins
2. Immobilon-CD, 0.45 um's, 25mm discs, Cationically charged (hydrophilic PVDF) - ICDM 025 00	Removal of solid matter proteins
3. Low water Extractable (TF) filters, 0.45 um's, 25 mm discs - HATF 025 00	Removal of solid matter without binding organic molecules
4. Hydrophilic Durapore, 0.45 um's, 25 mm discs - HVL-025 00	Removal of solid matter proteins
5. Immobilon (hydrophobic PVDF) high protein binding, 0.45 um's, 25 mm discs - ISEQ 025 00	Capture aldehydes
6. Isopore, HTTP (polycarbonate), 0.4 um's, 25 mm discs - HTTP 025 00	Capture aldehydes
7. Immobilon-P Transfer Membranes (PVDF), 0.45 um's, 15 cm x 15 cm - IPV11 151 50	Coating with antibodies to capture or remove antibody specific compounds
8. Immobilon Transfer Membranes (PVDF), 0.45 um's, 15 cm x 15 cm - ICDM 151 50	Coating with antibodies to capture or remove antibody specific compounds
9. Immobilon NC Pure, 0.22 um's, 15 cm x 15 cm - INCP 151 50	Coating with antibodies to capture or remove antibody specific compounds
10. Immobilon-NC (Surfactant free), 0.45 um's, 15 cm x 15 cm HATF 151 50	Coating with antibodies to capture or remove antibody specific compounds
11. MultiScreen - DEAE Anion Exchange Paper Opaque 96 well plates - MADE NO8 10	Capture aldehydes
12. MultiScreen - Phospho Cellulose Cation Exchange Paper Opaque 96 well plates MAPH NO8 10	Bind lipid peroxides for capture
13. SC X	MW Cutoffs timer polymers triglyceria
14. Polysulfone	Amino acids, peptides proteins
15. IGN-6	Microbes
16. ICE 450	Bind nucleotides DNA
<u>Sartorius</u> 131 Hearland Blvd., Edgewood, NY 11717	<u>APPLICATION</u>
1. Sartoband S	Bind monoclonal antibodies, etc.
2. Sartoband C	Endotoxin removal
3. Sartoband Q	Separate proteins anines
4. Sartoband D	DNA ADP ATP AMP
5. Sartoband LDA	Metals; cations
<u>Gelman/Pall</u> 600 South Wagner Road, Ann Arbor, MI 48103-9019	<u>APPLICATIONS</u>
1. Versapor	Pre-filter contaminants
2. UltraBind 05450	Bind monoclonal antibodies, etc.
3. Biodyne C	Separation proteins
4. Biodyne B	Endotoxins nucleotide separation

Fig. 21